Black Tea Grade Classification Method using Fourier-Transform Near-Infrared Diffusion-Reflection Spectroscopy and Principal Component Analysis

Rosa O. Anindya[1, a)], Jodelin Muninggar[1] And Ferdy S. Rondonuwu[1, 2, b)]

[1]*Faculty of Science and Mathematics, Satya Wacana Christian University, Diponegoro 52-60, Salatiga 50711, Indonesia*
[2]*Center of Near-Infared Aplications, Satya Wacana Christian University, Diponegoro 52-60, Salatiga 50711, Indonesia*

[a)]ferdy@staff.uksw.edu

Abstract. Indonesia black tea (*Camellia sinensis*) are processed based on several standard methods to achieve a certain grade. There are more than 25 grades are produced including Dust, Fanning (FANN) and Pekoe Fanning (PF). In general, physical appearances are similar each other, make it difficult to be differentiated by visual observations for non-expert people. During the packaging process, a tea grade can easily be pack using a back with the different label of grade. In the global market, such mistake should be avoided before shipping. Since shipping is usually involved a large number of bags, then fast and accurate and nondestructive methods are very critical. This paper discusses a method for distinguishing tea grades rapidly, accurately and nondestructively using Fourier-Transform near-infrared spectroscopy (FT-NIRS) and principal component analysis (PCA). Ninety-six tea samples from grade Dust, FANN and PF were separated into two groups; 66 samples were used for training set and 30 samples for validation set. The analysis successfully differentiates that of 3 different grades, indicating that the method is a potential alternative for tea quality control.

Keywords: Near-infrared spectroscopy, Indonesian tea, PCA